UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,071	06/20/2003	Kyeong Jin Kim	042933/302927	8921

826 7590 06/02/2008

ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
101 SOUTH TRYON STREET, SUITE 4000
CHARLOTTE, NC 28280-4000

EXAMINER	
PUENTE, EVA YI ZHENG	
ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
06/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/601,071	KIM, KYEONG JIN	
	Examiner	Art Unit	
	EVA Y. PUENTE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,4,6,7,9-17 and 19-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,4,6,7,9-17 and 19-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 3, 4, 6, 7, and 9-24 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

2. Claim 1 is objected to because of the following informalities: on line 23, please change "value" after "calculator" to -- values --. Please also make appropriate changes in claims 15 and 21.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3, 4, 6, 9-17, 19-22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al (US 2004/0120411) in view of Hatakeyama (US 6,385,753).

a) Regarding to claims 1 and 21, Walton et al disclose an apparatus comprising:

a selector configured to select metric calculator values for respective ones of a plurality of channels in a Multiple-Input, Multiple-Output communication system ([0004])

in which transmit data is communicated to a receiving station upon a plurality of channels and received as receive data thereat (Fig. 1), the metric calculator values selected for at least two of the channels differing from one another (selector 1176 in Fig. 11 perform metric calculation for each channel; [0192]; Table 2 shows that each channel can adapt different transmission modes associated with different SNR values); and

a decoder (1136 receive output of controller 970 in Fig. 11) configured to separately decode values of the received data received upon separate ones of the channels (1136a-s also receive receiver input data; [0191]).

Wherein, for the values of the received data received upon each of the channels, the decoder being configured to decode the values of the received data includes being configured to perform a path length estimation for the respective channel, the number of possible paths being selected is based on the metric calculator values selected (Walton et al further disclose that the decoder can be a Viterbi decoder ([0191]). It is well known in the technology that Viterbi decoder employ maximum-likelihood or minimum distance estimation. The input of Viterbi decoding is controlled by a controller (970), which also provides control to channel deinterleaver (1134). The output of deinterleaver is coupled to the input of the Viterbi decoder ([0191, lines 11-15]). The controller selects suitable metric values based on channel estimation and other criteria ([0192]). Therefore, the number of possible paths being selected is based on the metric calculator values selected).

Walton et al did not explicitly show a Viterbi decoder structure. However, Hatakeyama disclose a detailed Viterbi decoder (Fig. 6), wherein Euclidian distance for all the received data is calculated (number of possible path) and a minimum path length is selected (Col 6, L18-43; Col 9, L1-5; Col 9, L26-30). Therefore, it is obvious to one of ordinary skill in the art to combine the Viterbi decoder teaching of Hatakeyama with the MIMO system of Walton et al. By doing so, improve decoding accuracy in a communication system.

b) Regarding to claim 3, Walton et al disclose wherein the decoder is configured to perform a separate path-length estimations for each of the channels (1136a-s in Fig. 11).

c) Regarding to claim 4, Walton et al disclose wherein the decoder is configured to calculate a path length for each of a number of possible paths defined by possible of the transmitted data (Fig. 11; It is well known in the technology that Viterbi decoder employ maximum-likelihood or minimum distance estimation. Also Hatakeyama disclose a detailed Viterbi decoder (Fig. 6)).

d) Regarding to claims 6 and 22, Walton et al disclose wherein the decoder being configured to perform a path length estimation includes being configured to estimate a maximum likelihood path (Viterbi decoder [0191]; It is well known in the technology that Viterbi decoder employ maximum-likelihood or minimum distance estimation.).

e) Regarding to claims 9 and 24, Walton et al disclose wherein the selector is configured to select the metric calculator values based on communication conditions upon the respective channels (channel estimator 974; [0052-0054]; Table 2).

f) Regarding to claim 10, Walton et al disclose wherein the selector is configured to receive indications of the communication conditions upon the respective channels (974 in Fig. 11), the selector being configured to select the metric calculator values based on the indications (972 and 974 in Fig. 11).

g) Regarding to claim 11, Walton et al disclose wherein the selected number of possible paths is inversely related to the communication conditions such that the number of possible paths increases when the communication conditions worsen (It is well known that the Viterbi decoder's complexity increase as the signal condition worsen and the number of possible paths increase).

h) Regarding to claims 12 and 20, Walton et al disclose wherein the communication system operates pursuant to an OFDM scheme ([0189]) in which channels are defined upon channel subcarriers and wherein the metric calculator values selected by the selector are representative of communication conditions upon respective channel subcarriers (Fig. 11).

i) Regarding to claim 13, Walton et al disclose wherein the metric calculator values are maintained at a storage table, and wherein the selector is configured to select metric calculator values from the values maintained at the storage table (972 and 1178 in Fig. 11).

j) Regarding to claims 14 and 19, Walton et al disclose wherein the selector is configured to dynamically select the metric calculator values (970 in Fig. 11 and Table 2).

k) Regarding to claim 15, Walton et al disclose a method comprising:

selecting metric calculator values for respective ones of a plurality of channels in a Multiple-Input, Multiple-Output communication system ([0004]) in which transmit data is communicated to a receiving station upon a plurality of channels and received as receive data thereat (Fig. 1), the metric calculator values selected for at least two of the channels differing from one another (selector 1176 in Fig. 11 perform metric calculation for each channel; [0192]; Table 2 shows that each channel can adapt different transmission modes associated with different SNR values); and

separately decoding (1136 receive output of controller 970 in Fig. 11) values of the received data received upon separate ones of the channels (1136a-s also receive receiver input data; [0191]).

Wherein, for the values of the received data received upon each of the channels, the decoder being configured to decode the values of the received data includes being configured to perform a path length estimation for the respective channel, the number of possible paths being selected is based on the metric calculator values selected (Walton et al further disclose that the decoder can be a Viterbi decoder ([0191]). It is well known in the technology that Viterbi decoder employ maximum-likelihood or minimum distance estimation. The input of Viterbi decoding is controlled by a controller (970), which also provides control to channel deinterleaver (1134). The output of deinterleaver is coupled to the input of the Viterbi decoder ([0191, lines 11-15]). The controller selects suitable metric values based on channel estimation and other criteria ([0192]). Therefore, the

number of possible paths being selected is based on the metric calculator values selected).

Walton et al did not explicitly show a Viterbi decoder structure. However, Hatakeyama disclose a detailed Viterbi decoder (Fig. 6), wherein Euclidian distance for all the received data is calculated (number of possible path) and a minimum path length is selected (Col 6, L18-43; Col 9, L1-5; Col 9, L26-30). Therefore, it is obvious to one of ordinary skill in the art to combine the Viterbi decoder teaching of Hatakeyama with the MIMO system of Walton et al. By doing so, improve decoding accuracy in a communication system.

l) Regarding to claim 16, Walton et al disclose wherein selecting the metric calculator values comprises selecting the metric calculator values based on communication conditions upon the respectively channels (974 in Fig. 11).

m) Regarding to claim 17, Walton et al disclose wherein performing a path length estiamtion comprises performing a maximum-likelihood path estimation, including calculating a path length for each of a number of possible paths defined by possible values of the transmit data (Viterbi decoder [0191]; It is well known in the technology that Viterbi decoder employ maximum-likelihood or minimum distance estimation. Aslo Hatakeyama discloses a detailed Viterbi decoder (Fig. 6)).

5. Claims 7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al (US 2004/0120411) in view of Hatakeyama (US 6,385,753), and further in

view of Kim et al. (Joint Detection and Channel Estimation Algorithms for QS-CDMA Signals Over Time-Varying Channels).

a) Regarding to claims 7 and 23, Walton and Hatakeyama disclose all the subject matters above except for the specific teaching that the Viterbi decoder is using QRD technique.

However, Kim et al, disclose an algorithm of combining QRD technique with M-algorithm to estimate channel quality. The QRD-M algorithm reduces computational complexity and improves BER performance (page 845). Therefore, it is obvious to one of ordinary skill in art to combine the teaching of multicarrier communication system of Walton et al with QRD-M algorithm of Kim and Iltis. By doing so, reduce calculation complexity, reduce time consumption and improve signal quality in multicarrier communication system.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Y Puente whose telephone number is 571-272-3049. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eva Yi Puente
/E. Y. P./
Examiner, Art Unit 2611

May 23, 2008

/CHIEH M FAN/
Supervisory Patent Examiner, Art Unit 2611